WATER QUALITY AND QUANTITY SURVEY

HAMLET OF BLEZARD VALLEY

TOWN OF VALLEY EAST

December 1977

Ministry of the Environment
Ontario

WATER QUALITY AND QUANTITY SURVEY

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1. INTRODUCTION

At the request of the Regional Municipality of Sudbury, (Ref. Council Resolution #76-243), a water quality and quantity survey of the Hamlet of Blezard Valley was conducted by staff of the Sudbury District Municipal and Private Abatement Section of the Ministry of the Environment.

The purpose of the survey was to assess the need for a communal water and/or sewage system to service the study area.

The Hamlet of Blezard Valley is located on Regional Road 15, approximately 2 miles (3.2 km) west of Val Caron in the Town of Valley East. The study area (see Appendix A) included all of the hamlet except Flake Subdivision (located at the east end) which is already serviced by watermains and sewers.

There are approximately 170 residences in the study area. Approximately 97 of the residences are located on Main Street and therefore have access to the trunkmain of the Blezard Valley Water System. At the time of the survey 54 residences (all on Main Street) were serviced by the water system.

Blezard Valley is mainly "strip" development in an east-west direction along Regional Road 15 for approximately 1.7 miles (2.7 km). The north-south development extends for approximately 0.2 miles (0.3 km) north, and 0.5 miles (0.8 km) south of Regional Road 15.

The soil is mostly silty clay and the topography is flat. Drainage is provided by Whitson Creek, located at the eastern edge of the hamlet.

2. SURVEY PROCEDURES

The Sewer and Water Section of the Regional Municipality of Sudbury was contacted for the purpose of determining which homes were already serviced by the Blezard Valley Water System. An attempt was made to survey each of the 116 homes that were not connected to this system.

The field work of the survey was completed between May 24, and May 26, 1977.

During the survey a questionnaire (see Appendix B) was utilized to determine the type, age, and problems of both the water supplies and the sewage disposal systems. A total of 81 questionnaires representing 70% of the unserviced homes were completed.

Samples of drinking water were collected at 89 (77%) of the unserviced homes. If the residents were not home at the time of the survey water samples were collected from an outside tap (if possible). Samples were taken to the Sudbury and District Health Unit Laboratory in Sudbury for bacteriological examination and sent to the Ministry of the Environment Laboratory in Toronto for chemical analyses. Chemical analyses included hardness, alkalinity, iron, chloride, pH, nitrate, Kjeldahl nitrogen, manganese, carbon, colour and turbidity.

Properties were inspected for indications of sewage system malfunctions and sketches were drawn showing the locations of water supplies and sewage disposal systems in relation to buildings.

3. SEWAGE DISPOSAL

Of the 81 properties inspected, 80 were serviced by septic tanks and tile fields and 1 was serviced by a leaching pit. The ages of the systems ranged from 1 to 20 years (see Appendix C).

Sewage system problems (tank overflow or freezing in winter) were reported at 9 (11%) of the residences. No problems were reported at the other 72 (89%) of the residences.

During the inspection 6 malfunctioning systems were noted and immediately reported to the Sudbury and District Health Unit. These problems consisted of 3 systems causing sewage to pond on the ground surface, 2 systems causing wash water to be discharged onto the ground, and 1 complaint of odour from a neighbouring tile field.

4. WATER SUPPLY

All of the residents surveyed obtained their drinking water from point wells, ranging in age from 1 to 20 years (see Appendix C). The points ranged in depth from 12 to 50 feet with a mean depth of 25 feet.

4.1 Water Quantity

The quantity of water available in the study area was determined from the questionnaire responses.

Of the 81 households surveyed, water quantity was reported to be often inadequate at 2 (3%), sometimes inadequate at 7 (9%), and adequate at 72 (89%).

Some residents complained of low water pressure. This problem can be attributed to either malfunctioning pumps or faulty plumbing.

4.2 Water Quality

The assessment of water quality was made using both information supplied by residents, and the results of the sample analyses.

Water quality problems were reported at a total of 16 (20%) of the residences. These problems included taste problems at 14 (17%), odour problems at 12 (15%) and staining problems at 11 (13%) of the residences.

The results of the bacteriological examinations of the drinking water samples indicated that only 1 sample contained total and/or fecal coliforms. The results of this sample were 2 total coliforms/100 ml and 0 fecal coliforms/100 ml.

The results for the major parameters of the chemical analyses of the 89 water supplies sampled are tabulated in Appendix D.

Nitrate concentrations ranged from less than 0.1 mg/l to 15.0 mg/l with a mean value of 3.1 mg/l. A total of 6 (7%) of the samples exceeded the Ministry of the Environment criterion (for nitrate concentration) of 10.0 mg/l. Water supplies with excessive nitrates were all located in the area south of Main Street (see map, Appendix A). The reasons for the high nitrate concentrations could not be determined on an individual basis. One possible reason is that the overburden is nitrogen-enriched soil characteristic of agricultural land. As high nitrate concentrations are a potential health hazard to infants, these residents with concentrations in their water supplies that exceeded 10 mg/l were notified by letter.

Iron concentrations ranged from < 0.05 mg/l to 1.5 mg/l. The Ontario Ministry of the Environment limit for iron concentrations (0.3 mg/l), which is based on aesthetic and taste considerations, was exceeded in 3 (3%) of the samples.

Manganese concentrations ranged from 0.001 mg/l to 1.15 mg/l. The Ontario Ministry of the Environment limit for manganese concentrations (0.05 mg/l), which, like iron, is based on aesthetic and taste considerations, was exceeded in 10 (11%) of the samples.

As colour and turbidity are not health hazards they were analyzed for in only 28 random samples.

Drinking water in which colour exceeds 5 Hazen Colour Units may be aesthetically displeasing. In groundwater, colour is usually associated with iron and/or manganese concentrations. It was found that 8 (29%) of the samples exceeded the recommended limit.

Drinking water in which turbidity exceeds 1 Formazin Unit may also be aesthetically displeasing. It was found that 4 (14%) of the samples exceeded the recommended limit.

The other parameters in the chemical analyses did not constitute widespread or significant problems.

5. CONCLUSIONS

1. No serious water quality or quantity problems existed at the time of the survey.

2. The operation of subsurface sewage disposal systems had not affected the drinking water supplies at the time of the survey.

3. The soil and topography of the properties in the study area are suitable for the use of private subsurface sewage disposal systems.

4. Communal water and/or sewer systems to service the study area are not warranted by environmental or health considerations at the present time.

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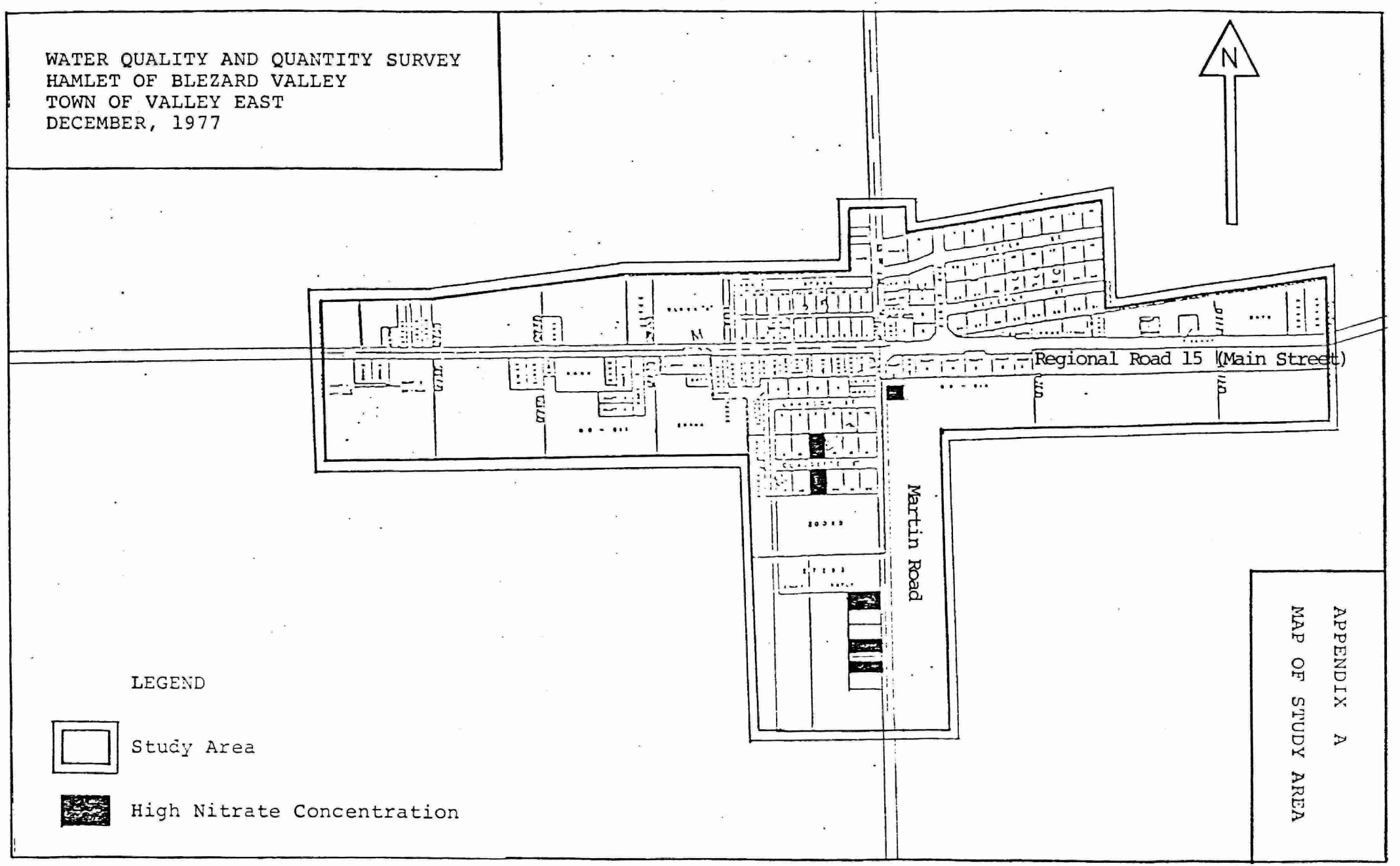

APPENDIX A
MAP OF STUDY AREA

ONTARIO MINISTRY OF THE ENVIRONMENT

Please check, or fill in appropriate space

APPENDIX B

NAME _____ PHONE NUMBER _____

STREET _____ MAILING _____

ADDRESS _____ ADDRESS _____

OWNER ( ) TENANT ( )

NUMBER OF INDIVIDUALS USING YOUR FACILITIES _____

NUMBER OF BEDROOMS _____

WATER

1. What type of water supply do you presently use?

   a) PRIVATE WELL ( )

      DUG ( ) DRILLED ( ) BORED ( ) POINT ( )

      NUMBER OF HOUSEHOLDS USING WELL _____

   b) SURFACE WATER ( )

      LAKE ( ) RIVER ( )

   c) OTHER ( )

      SPECIFY _____

      _____

2. Depth of Well _____

3. How old is this supply?

   1-5 years ( ) 6-10 years ( ) 11-15 years ( ) Older ( )

4. In your opinion, what is the quality of the water?

   Good ( ) Average ( ) Poor ( )

5. Do you experience problems with:

   a) Taste ( ) Frequently ( ) Seldom ( ) Never ( )

   b) Odour ( ) Frequently ( ) Seldom ( ) Never ( )

   c) Staining ( ) Frequently ( ) Seldom ( ) Never ( )

6. Do you have a sufficient supply of water?

   Always ( ) Most of the time ( ) Seldom ( )

SEWAGE

7. What type of sewage disposal system do you presently use?

   Septic Tank and Tile Field ( ) Outdoor Privy ( )

   Holding Tank ( ) Leaching Pit ( )

8. How old is this system?

1-5 years ( ) 6-10 years ( ) 11-15 years ( ) Older ( )

9. Have you had any problems with your sewage disposal system?

None ( ) Few ( ) Many ( )

10. If so, please give brief description:

_____

_____

11. Distance from the septic tank to the well:

a) Less than 25' ( )

b) 25' or more, but less than 50' ( )

c) 50' or more, but less than 75' ( )

d) 75' or more, but less than 100' ( )

e) 100' or more ( )

12. Distance from edge of tile field to the well

a) Less than 25' ( )

b) 25' or more, but less than 50' ( )

c) 50' or more, but less than 75' ( )

d) 75' or more, but less than 100' ( )

e) 100' or more ( )

13. Size of Lot _____ x _____

14. Please sketch location of buildings, sewage disposal system, and well in relation to your property lines on the back of this page. Please show size of lot on the sketch.

APPENDIX C

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AGES OF WATER AND SEWAGE SYSTEMS

TABLE 1

SEWAGE DISPOSAL

Ages (years)	Number	Percentage
1 to 5	14	17.3%
6 to 10	29	35.7%
11 to 15	16	19.8%
older than 15	16	19.8%
unknown	6	7.4%
TOTAL	81	100.0%

TABLE 2

WATER SUPPLY

Age (years)	Number	Percentage
1 to 5	18	22.2%
6 to 10	29	35.8%
11 to 15	10	12.4%
older than 15	20	24.7%
unknown	4	4.9%
TOTAL	81	100.0%

TABLE 3

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CHEMICAL ANALYSIS RESULTS

PARAMETER	RANGE OF CONCENTRATION	NUMBER	PERCENTAGE	HIGH
Nitrate	< 0.1 mg/l to 5.0 mg/l	70	78.7%	15.0 mg/l
	5.1 mg/l to 10.0 mg/l	13	14.6%	
	> 10.0 mg/l	6	6.7%	
Iron	< 0.05 mg/l to 0.30 mg/l	86	96.6%	1.50 mg/l
	0.31 mg/l to 1.00 mg/l	0	0	
	> 1.00 mg/l	3	3.4%	
Manganese	0.001 mg/l to 0.050 mg/l	79	88.8%	1.15 mg/l
	0.051 mg/l to 1.00 mg/l	9	10.1%	
	> 1.00 mg/l	1	1.1%	
Colour*	< 5 Hazen Units (H.U.)	20	71.4%	140 H.U.
	6 H.U. to 100 H.U.	7	25.0%	
	> 100 H.U.	1	3.6%	
Turbidity*	< 1.0 Formazin Turbidity Units (F.T.U.)	24	71.4%	23.0 F.T.U.
	1.1 F.T.U. to 10.0 F.T.U.	3	10.7%	
	> 10 F.T.U.	1	3.6%	

* Colour and Turbidity checked in 28 samples.

APPENDIX D

TABLE 4

APPENDIX E

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SAMPLES EXCEEDING M.O.E. STANDARDS*

PARAMETER	NUMBER	PERCENTAGE
Nitrate	6	6.7%
Iron	3	3.4%
Manganese	10	11.2%
Colour**	8	28.6%
Turbidity**	4	14.3%

*M.O.E. Standards:	Nitrate	10 mg/l
	Iron	0.3 mg/l
	Manganese	0.05 mg/l
	Colour	5 Hazen Units
	Turbidity	1.0 Formazin Units

** Colour and Turbidity checked in 28 samples.

GLOSSARY

APPENDIX F

(i) BACTERIOLOGICAL EXAMINATION

Total Coliform Organisms

Total coliform organisms include a wide variety of bacteria ranging from the genus (Group), Escherichia Coli, which originate mainly in the intestines of man and other warm-blooded animals, to the genera Citrobacter and Enterobacter aerogenes. The latter genera are basically found in soil but are also present in faeces in small numbers.

The presence of total coliforms in water may indicate soil runoff or more important, less recent faecal pollution since organisms of the Enterobacter - Citrobacter groups tend to survive longer in water than do members of the Escherichia Coli group, and even multiply when suitable environmental conditions exist.

Faecal Coliform Organisms

The faecal coliform organisms are those coliform bacteria which are all intestinal in origin and usually outnumber all other coliform types in human and animal intestines. Most of the coliform bacteria found by the faecal coliform test are of the genus Escherichia Coli. However, their death rate outside the warm body is high and accordingly if coliforms present in the water are primarily faecal coliforms, and their number is high, the pollution is probably nearby and recent. Smaller numbers with a high portion of faecal

coliforms may indicate nearby pollution with counts reduced by dilution.

Results are reported "coliform count per 100 millilitres".

(ii) CHEMICAL ANALYSIS

Hardness

The total hardness measures the "soap consuming power" of a water due to the presence of metallic cations. The principle components of hardness are calcium and magnesium although a number of heavy metals may contribute to a small extent. The hardest waters are usually encountered in regions with thick top soil layers and extensive limestone deposits.

Hard waters are objectionable because they form insoluble compounds or curds with soap. This substantially reduces the efficiency of washing procedures even when detergents are used. Waters with high hardness are know to cause the formation of a lime scale in plumbing fixtures.

Alkalinity

The alkalinity of the water is generally used to define the buffering capacity or the waters capability to resist a change in pH. This means that if an acidic waste is discharged to a natural water system the effect on the water may not necessarily be detected as a pH change but will be detected as a drop in alkalinity.

Iron

Iron is the most abundant of the heavy metals in nature, but despite this abundance, it is generally found in relatively low levels in natural surface waters. Iron is non-toxic even at high levels but becomes objectionable in water because of the colour and bitter taste it imparts. The water quality objective for Ontario drinking water is 0.3 mg/l as iron.

Chloride

Chloride is a major anion in domestic wastes and in many natural water supplies. Urban runoff often contains high concentrations of chloride in the winter time due to road application of salt. Chloride poses no direct health hazard, but the water quality objective for domestic water supplies has been specified at 250 mg/l to prevent a salty taste. This salty taste is variable and dependent on the composition of the water. If chloride is present as sodium chloride a dectectable taste will be present at 250 mg/l. If chloride is present as calcium or magnesium chlorides, waters containing as much as 1,000 mg/l may not have a noticeable taste.

pH

The Hydrogen Ion concentraction in water is measured as pH. Specifically, it is the negative logarithm of the hydrogen ion concentration expressed in moles per litre. Thus, each change of one unit in pH corresponds to a 10 fold change in

the hydrogen ion concentration.

Apparent Colour Units

Many lakes and rivers, especially in Northern Ontario, have a characteristic yellowish-brown colour due to the presence of humic acids derived from the decomposition of plants. Lakes of this type are commonly referred to as "acid bog" or "brown water" lakes. A similar colour may also occur when iron and maganese are found in abundance.

Water coloured naturally by humic substances is harmless, but considered unacceptable for drinking purposes because of its appearance. The objective of 5 colour units for domestic water supplies is therefore based on aesthetic rather than on health standards.

Turbidity

The turbidity is a measure of the opticle properties of a sample which causes light to be scattered and adsorbed rather than transmitted in a straight line. Historically, the turbidity was measured using a Jackson candle turbidmeter, but the insensitivity of this instrument lead to the development of secondary techniques which can measure the much lower turbidities commonly encountered in modern water treatment processes.

Specific Conductance

The specific conductance is a measure of a waters capacity to carry an electric current. This property is related to

the total concentration of ionized substances in the water. The conductivity of natural waters is mainly due to the presence of calcium, magnesium, sodium, pottassium, bicarbonate, chloride, sulphate and nitrate ions.

Specific conductance related quite well to the total dissolved solids concentration. Ontario rivers and lakes free of industrial wastes, have a total dissolved solids concentration generally equal to 0.65 ± 0.10 x the specific conductance.

Nitrate (Nitrogen)

Nitrates are formed via the oxidation of nitrite by autotrophic nitrifying bacteria and represents the most highly oxidized form of nitrogen in the nitrogen cycle. It is generally found at trace levels in all surface waters but may become very high in ground waters as a result of soil leaching.

Nitrates are objectionable because their nutritive properties promote the excessive growth of algae and other aquatic plants. Excessive amounts in drinking water contribute to a disease known as infant methemoglobinemia in which the oxygen carrying capacity of the blood is inhibited. The maximum acceptable level for domestic water supplies in Ontario is 10 mg/l of nitrate as nitrogen in the water if it is to be used for infant feeding. Nitrates are non-toxic to adults.

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